

THE ANNALS
AND
MAGAZINE OF NATURAL HISTORY.

“..... per litora spargite muscum,
Naiades, et circum vitreos considite fontes :
Pollice virgineo teneros hinc carpite flores :
Floribus et pictum, divæ, replete canistrum.
At vos, o Nymphæ Craterides, ite sub undas ;
Ite, recurvato variata corallia trunco
Vellite muscosis e rupibus, et mihi conchas
Ferte, Deæ pelagi, et pingui conchyliis succo.”
Parthenii Ecl. 1.

No. 55. MARCH 1842.

I.—*Organographic and Physiologic Sketch of the Class Fungi*,
by C. MONTAGNE, D.M. *Extracted from* ‘*Histoire physique, politique et naturelle de l’île de Cuba,*’ par M. RAMON DE LA SAGRA, *and translated and illustrated with short notes by the Rev. M. J. BERKELEY, M.A., F.L.S.*

THE class Fungi is without doubt one of the largest of the vegetable kingdom, and the study of the productions of which it is composed is one of the most difficult in botany, whether on account of the infinitely varied forms and disguises which they assume, their small size requiring the aid of the microscope, or their obscure place of growth.

Neglected by the older botanists, Fungi began to attract attention only towards the commencement of the last century. It is to the immortal Micheli that we owe the first just notions upon these vegetables ; it is he who first made known the sporidia of Agarics, of which some modern mycologists claim the discovery, and those other organs which many, even at the present time, regard with Bulliard as real anthers, but to which he assigned other functions. For him again was reserved the honour of placing beyond doubt the reproduction of these plants by seeds or sporidia, which the greater number of botanists before his days believed to be the result of the decomposition of organized bodies, or of a spontaneous or equivocal generation. Gleditsch and Batarra followed, though at a distance, his footsteps, and fully confirmed his observations. Bulliard not only recognised the fact, previously

announced by Micheli, that the sporidia of Agarics and Boleti are naked or exogenous, but he was the first to conjecture that these organs, which the illustrious Florentine regarded as destined simply to keep the gills separate, were in fact equivalent to the stamens of higher plants. The very limited number of species known at that time did not require a great degree of perfection in the mode of classification.

But mycology soon increased to such an extent as to require some one to arrange its riches, and render them easily accessible. Persoon, a man of sound judgement and great talent for observation, accomplished with success the arduous task, in publishing in 1801 his excellent Synopsis, entitled by Fries 'opus aureum,' in which are arranged with peculiar tact all the species of Fungi then known. Link, in his new arrangement of the *Gymnomycetes*, and Nees von Esenbeck, in his 'System der Pilzen und Schwämme,' made valuable contributions to systematic mycology. Fries, the last in point of time, but in my opinion the greatest of all, who has passed half his life in the midst of forests, tracing the different phases of evolution of these frequently ephemeral productions, Fries, the worthy successor of Linnæus, has also made various and important emendations of the natural method of the illustrious Nees von Esenbeck. If he is not altogether irreproachable, especially as regards details of intimate structure, which demand imperatively the aid of good microscopes, and considerable skill in their use, not to mention the fact, that when his system was published the modern improvements had not been made, what mycologist will dare to compete with him in loftiness of conception, immense learning, and especially in that genius which all his works exhibit, but more peculiarly his arrangement of the genus *Agaricus*, in the 'Systema Mycologicum?' an arrangement perhaps more philosophic, certainly more calculated to lead to the determination of the species of this difficult genus, than the new method adopted by him in the 'Epicrisis.'

As it is not my intention to give a history of mycology, I must confine myself to a few words. I cannot therefore review the works of those who have contributed to its progress by local floras, monographs, or organographic, physiologic, or medical remarks on Fungi. To enable the student, however, to have recourse to the fountain-head, and to consult the different materials scattered in scientific journals, or particular treatises which have appeared since the time of Persoon, I shall give as complete a list as possible of the most important works relating to this interesting class, reserving to myself the power of showing, in the general remarks which

follow, the honourable rank which each has acquired by his labours*.

Fungi then are agamous vegetables, formed of variously-shaped cells, destitute of epidermis, and consequently of stomata. They consist of a vegetative system (*mycelium*), formed of elongated, simple, or articulated filaments, concealed within the matrix, or creeping and expanded over its surface, from which, according to the different degrees of complication of the fungus, arise extremely varied forms of fructification. The modifications which the fruit receives, either from the mode of evolution of the mycelium, or from the stage at which it is arrested, are such, that we may readily consider as very distinct families the six natural divisions generally established in this class.

* I shall confine myself here to indicating the sources from which a more or less complete knowledge may be derived of the structure, functions, nomenclature and classification of Fungi, without omitting those which relate to their useful or noxious qualities. In strict justice I ought to commence with Micheli, but I shall begin at a much more recent period.

Bulliard, *Hist. des Champign. de la France*, 5 vol. 4to, Paris, 1791.—Paulet, *Traité des Champ.*, 2 vol. 4to, Paris, 1793.—Sowerby, *Eng. Fungi*, 3 vol. fol. Lond. 1799.—Persoon, *Synops. Meth. Fungorum*, Gott. 1801, 8vo. *Traité Champign. comest.*, 8vo, Paris, 1819. *Mycol. Europ.*, tom. i. ii. iii. 8vo, Erlang. 1822—1828, not completed.—Link in *Berl. Mag.* 1809—1815, and in *Spec. Plantar. Linn. ed. Willd.*, tom. v. vi.—Nees von Esenbeck, *Das system der Pilzen und Schwämme*, 4to, Nurenb. 1817.—Fries, *Syst. Mycol.*, 3 vol. 8vo. Gryphiswald, 1821—1829.—*Syst. Orb. Veget.*, 8vo, Lund. 1825. *Elenchus Fungorum*, 8vo, 2 vol. Gryphisw. 1828. *Eclog. Fung. in Linnæa*, t. v. *Epicrisis, seu Synopsis Hymenomyc.*, 8vo, Upsal, 1836—1838.—Adolphe Brongniart, *Classif. nouv. des Champ. in Dict. class. hist. nat.*, tom. v. p. 155, &c.—Trattinick, *Die Essbare Schwämme Oesterreichs*, Wien, 1830, 8vo (2nd edit.).—Vittadini, *Monographia Tuberacearum*, Mediol. 1831, 4to.—Krombholz, *Naturgetreue Abbild. der Essbaren schädlichen und verdächt. Schwämme*, Prag. 1831.—Roques, *Hist. des Champ. comest. et vénén.*, 4to, Paris, 1832.—Ünger, *Die Exantheme der Pflanzen*, Wien, 1833, 8vo, and *Ann. Sc. Nat.*, 2 série, tom. ii. p. 193.—Secretan, *Mycog. Suisse*, 8vo, 3 vol. Genève, 1833.—Dutrochet, *Obs. sur les Champ.*, *Ac. des Sc. Paris*, March 3, 1834.—Klotzsch in *Dietrich's Flor. Reg. Bor.*, 8vo, Berol. 1834.—Corda sur les Anthères de Micheli dans les Champ. charnus, *Flora* 1834, p. 113—116. Sur les Fibres Spirales des Trichiacées, l. c. 1838, p. 419. *Ic. Fung.*, tom. i.—iv. fol. Prag. 1837—40.—Berkeley, *Fungi in Hook. Eng. Fl.*, tom. v. p. 2. Lond. 1836, 8vo. On the Fructif. of the Pileate and Clavate tribes, &c., *Ann. of Nat. Hist.* i. On the Fructification of Phallus, Lycoperdon, &c., *Ann. of Nat. Hist.*, translated by the author in *Annales des Sciences Nat.*, 2 sér. tome xii. p. 160.—Léveillé, *Rech. sur l'Hym. des Champ.*, l. c. t. viii. p. 321. *Recherches sur les Urédinées*, l. c. t. xi. p. 5.—Trog sur la Végétation Fongique, *Flora* 1837, p. 609.—Philippar, *Traité organ. sur la Carie et la Charbon*, &c. 8vo, Versailles, 1837.

[To which I must add, Sturm's *Deutschl. Fl.*, 3te Abth.—Ehrenberg in *Nov. Act. Nat. Cur.*, tom. x. pars i. 1821; the excellent treatise just published in *Ann. d. Sc. Nat.* by Tulasne on Elaphomyces, and Montagne passim in *Ann. Sc. Nat.*—M. J. B.]

These are, commencing with the most simple,
 1. *Coniomycetes*; 2. *Hyphomycetes*; 3. *Gasteromycetes*;
 4. *Pyrenomycetes*; 5. *Discomycetes*; 6. *Hymenomycetes*.

The 3rd, 4th and 5th of these families have the fructification concentric or included (*Fungi involuti*); the remaining three eccentric or naked (*Fungi evoluti*). Fries gives the name of *Cryptomycetes* to the two first, reserving that of *Phaneromycetes* to the four last families.

Coniomycetes, Nees von Esenbeck.

The fungi of this group were, for the most part, known to the earlier botanists, who regarded them as mere exanthemata. Divided into Epiphytes and Entophytes, according as they are produced upon or beneath the cuticle of vegetables, their origin and nature are still matter of dispute. Some modern naturalists, and amongst them Unger, who has written a treatise on the subject, hold, as regards the latter, that they arise from a pathologic affection of the vegetable itself, or of the respiratory organs. More recent works, however, especially that of L veill  upon *Uredines*, have successfully combated these two opinions. M. Corda, who had formerly contended for the German notions, has lately proved, in an admirable analysis of *Puccinia graminis* (Ic. Fung. iv. t. 3. f. 37.), that the sporidia, far from being a disease of the utricles, spring clearly from a mycelium whose threads are figured as scattered amongst the intercellular passages of the leaf. Even before these works of L veill  and Corda, I had published a fact (Prodr. Fl. Fernand., Ann. Sc. Nat., 2 s r. tom. iii. p. 256) which appeared to me decisive on the point, viz. the presence on the same leaf of an * cidium* and *Uredo*; and, what is more conclusive, M. Corda has seen* *Pucc. graminis* and *C oma linearis* united in the same stroma.

In the species of this numerous family, the vegetative system is filamentous or cellular. In the first case, the mass of filaments of which it is formed is called *hypothallus*, *hyphasma*, or simply *floci*. These threads are usually articulated, much branched, and entangled. In the second case it is called *stroma* or *hypostroma*. This is sometimes discoid as in *Tuberculari *, sometimes nucleiform and cellular, bearing the spores on its surface. Sometimes the sporidia spring from very short threads (*floci spurii*), scarcely capable of being regarded as a hypothallus. The mycelium, by its metamorphosis into spores, sometimes forms the whole plant, or it is so obliterated that the least trace is not visible, in which case it is probable that a mucilaginous medium has served as a matrix for the spores, as is the case in the parallel series of *Phyce *. Lastly, in more highly developed forms, the mycelium produces a cellulo-membranous pouch†,

* Philippar, however, is of opinion that these two species are identical. *Uredo rubigo vera* is certainly only a form of *Puccinia graminis*. See Henslow's Report on the diseases of wheat, 1840; and a paper on the specific identity of the fungi producing rust and mildew. Journal of Roy. Ag. Soc., vol. ii. part ii. 1841.—M. J. B.

† Corda refers these to his *Myelomycet s*, = in part *Gasteromycetes*, Fr.

which has been called *peridium* or *pseudo-peridium*, from the base of which spring sporidia in moniliform rows, as in *Peridermium*, *Æcidium*, *Endophyllum*.

The fungi of this order are, as stated above, Epiphytes or Entophytes. The former, which grow on dead vegetables, are frequently at first concealed under the epidermis, or amongst the woody fibres which they burst or displace in order to continue their morphosis externally. The Entophytes (*Hypodermii*, Fr.) pass through all the phases of their development* under the thin bark of trees, or under the epidermis of living or dead leaves, or of herbaceous stems. It is only at the moment of the dispersion of the spores, or a little before this epoch, that, rupturing the raised and distended cuticle which covers them, they are exposed to the light, and receive from atmospheric influences the completion of their development. Whatever be the nature of the mycelium, its regular and normal morphosis ends always in the production of the spores, the only aim of nature in the formation of these singular productions, which have been compared, and not without reason, to the Entozoa or intestinal worms of animals.

The sporidia, whether they arise from the metamorphosis of the threads of the mycelium, or derive their origin from the matrix on which they are produced, become at length free. Their forms are numberless; they are simple or articulate, that is to say, formed of a single cell (*Uredo*), or several placed end to end (*Puccinia*, *Phragmidium*), or more rarely side by side in the same plane (*Triphragmium*), constantly deprived of a common envelope (Corda, *l. c.* p. 10). The sporidia, whether sessile or borne by a peduncle (*hypopodium*, Corda), and consisting of one or more cells, are, as regards each cell, formed of a simple membrane (*episporium simplex*), as in *Uredo*, or double (*episporium duplex*), as in *Puccinia*. In the latter case, the two coats of unequal thickness which constitute the episporium are so intimately united, that it is impossible to separate them; the outer is called *exosporium*, the inner *endosporium*. The episporium is smooth, wrinkled, warty, hispid, &c., and encloses the nucleus in its cavity. This, according to Corda, consists of a gelatinous fluid, in which are suspended a few oily globules, and in which swim some granules, endowed, during the life of the plant, with molecular motion, but which, as it approaches maturity, have a tendency to become concrete.

It is superfluous to add, that it is upon the infinite variety of forms assumed by the sporidia and mycelium that the perhaps too numerous genera of this family are founded. In this respect I am of Fries's opinion, who says, *Inter hypodermios maximam partem (Coniomycetum) efficientes, typos nosse sufficiat, nisi singulorum mutationibus in singulis plantis observandis vitam velimus dicare* (Syst. Myc. iii. p. 457).

* Professor Henslow, who has lately paid great attention to the subject, has satisfied himself that *Aregma* and *Triphragmium* are a more highly developed state of certain so-called *Uredines*. This too is probably the case with *Xenodochus*. I am myself convinced that many of the brown *Uredines* are merely an early stage of growth of certain *Pucciniæ*.—M. J. B.

The *Coniomycetes*, which are real parasites, grow on dead or living vegetables; in the latter case they attack in preference herbaceous plants, and rather the leaves than the stems, or the reproductive organs, which unfortunately are not always exempt from their ravages. It is in this class that the most injurious fungi are found, producing rust, bunt, mildew, &c.*, the scourge of farmers. It is not my intention to describe these here. It is among plants of this family that we observe that method of reproduction by division † (“tomipare”), which we shall again notice in the following family. With regard to the mode of generation and propagation of *Coniomycetes*, I shall make some observations in the general remarks on the class.

Hyphomycetes, N. von E.

This family is not distinguished from the foregoing ‡ merely by the presence of a vegetative system, as Fries supposes, for we have just seen that a great number of *Coniomycetes* possess one. We must then look for the difference in a higher degree of development, in a more complicated structure, and especially in the free evolution of the mycelium and sporidia.

It is divided into two grand sections, characterized by a filamentous stroma, but which differ in this, that in the one the sporidia are naked or merely clothed with the same coat as the matrix, while in the other they are at first contained in a sort of peridium, formed by the swelling of the end of the filaments, from which they escape when mature.

The mycelium, though always free, is not alike in both these sections. In the first its filaments form a sort of floccose stroma on which the sporidia are fixed, or rather in the midst of which they are dispersed; these filaments are called *floci*.

In *Sporotrichaceæ* § all the filaments recline upon the matrix, and the spores, scattered amongst them, are in some degree covered by them, as by a veil, an organ which we shall find more decided in *Phaneromycetes*. Here then the mycelium is confused with the fertile or spore-bearing threads, or rather the whole plant consists of mycelium. But in the *Botrytideæ* these filaments are of two kinds; the one erect and fertile (*floci fertiles*), the other barren, reclining on the matrix (*hyphasma* or *hypopodium*). These may be regarded as the vegetative system, from whence spring the former,

* It is curious, that in England, rust, though often extremely abundant, is seldom considered injurious, except perhaps to some of the new wheats, though it appears to be very destructive in France. See Henslow, *l. c.*—M. J. B.

† Compare the observations of Mohl and others on the formation of cells.—M. J. B.

‡ It would be better perhaps to place this family first, at least if we adopt a circular or reticulate system. There would then be a natural transition on the one side to *Hymenomycetes* through *Isaria*, and on the other to some of the more obscure *Pyrenomycetes* through *Stilbospora*, &c. This is of course on the supposition that *Gasteromycetes* be entirely reviewed.—M. J. B.

§ It is however to be remarked, that most species of *Sporotrichum* are spurious. *Trichothecium roseum* is in reality a *Dactylium*, &c.—M. J. B.

which bear the fruit. It is amongst the barren filaments that the granules called *conidia* occur, analogous to the *gonidia* of Lichens; and which must be cautiously distinguished from true sporidia*. In proportion as the structure is more complex, these filaments, erect or decumbent, which were at first free, or only more or less loosely interwoven, are closely united, especially at the base, so as to form a stem-shaped stroma, the extremity of which, at a greater or less distance, supports the sporidia. We see this disposition in the genera *Coremium* and *Isaria*†, which M. Corda refers to *Hymenomyces*.

In the second section, composed of *Mucorinae*, the erect tubular filaments, whether springing or not from a mycelium or decumbent threads, swell at their free extremity into a vesicle. By observations which throw a brilliant light on the morphosis of these plants, Corda (Ic. Fung. ii. p. 19. t. 11. f. 75.) has proved that the vesicle or sporangium, at first in connexion with the cavity of the stem, is soon separated by a columella or septum which is hemispherical, campaniform, &c., of which he has been able to follow the development, and upon which the spores, most frequently united like necklaces, acquire at length the degree of development necessary for the reproduction of the species ‡. This vesicle, which is termed *peridolum*, opens regularly or irregularly.

In two genera (*Pilobolus* and *Chordostylium*), analogous forms to which we shall find in the *Gasteromyces*, the peridium separates entire from the summit of the simple filament which bears it, and is thrown to a distance by an elastic force. Persoon and Corda, perhaps with reason, place them in the following family.

The fertile filaments of *Hyphomyces*, extremely variable in their form, are simple or branched, continuous or articulate, hyaline or dusky, &c. Their mode of ramification varies with the species and genera; it is dichotomous, verticillate, virgate, &c. Indehiscent, and in themselves generally colourless and pellucid, they owe their various hues to the juices which they contain.

In *Dematie*, the fertile filaments, besides being usually destitute of mycelium, or having one of a crustaceous nature, are remarkable for their rigidity, and their olive, dingy or black hue; they are septate, and bear sporidia adhering to the sides or tips of the threads

* They often abound in the mycelia of *Hymenomyces*, which are in consequence described as *Sporotricha*.—M. J. B.

† As regards the first at least, Corda's notion is quite untenable, for it is more than doubtful whether its species be not mere modifications of *Penicillia*. *Isaria* most beautifully unites *Hymenomyces* with *Hyphomyces* through *Typhula*.—M. J. B.

‡ On the strength of these observations, Corda has separated from true *Hyphomyces* this second section, in order to unite it to the following family, changing its name into *Myelomyces*. Ought we however to place more reliance on the presence of a peridolum than on the filamentous structure and mode of vegetation? The same might be said of *Æcidium*, at present included in the foregoing family, and of which the same naturalist, in consequence of the presence of a peridium, has likewise changed the place in the system.

and their branches; they are usually termed fibres (*fibrae*). We still observe in them reproduction by division; that is to say, in *Cladosporium*, for example, the septate extremity of the principal filament or branch is changed into sporidia which separate from it and fall successively.

The sporidia are simple or compound. The first are formed of a single hyaline membrane (*episporium*), sometimes marked with a hilum, and always containing a sporaceous, variously coloured mass, which is termed *nucleus*. They enclose also, though more rarely, granules which have been considered as sporidiola*. Though frequently isolated, they are sometimes heaped about the tips or sides of the filaments which support them. At other times, they form, as it were, necklaces whose grains are either contiguous, or separated by a connecting band (*desmos*) interposed between each of them. The compound sporidia are observed only in *Dematiæ*, where, according to Corda, they present the same structure as that which I described after him in the spores of *Puccinia*. As to general form, they are spherical, ovoid, oblong, elliptic, reni-, pyri-, or clavi-form. They are smooth, angular, scabrous, wrinkled, papillary, rough, with hairs or prickles. Their colour is extremely variable, with the exception of deep green and blue†.

In the greater number of the species of this family, the sporidia originate clearly from the granular sporaceous mass, suspended in a viscid or watery fluid which circulates in the tubes of the continuous filaments. Fries has seen an ascending current in the fluid of *Asco-phora Mucedo*. I have confirmed the fact in my experiments on Muscardine, without being able to decide whether this motion be vital or molecular. But at the same epoch I have certainly seen in *Botrytis Bassiana* the sporidia, or globular cells which did not seem to differ from them, rise incessantly in the tube, from the base to the summit of the filament, at the time when the reproductive bodies are formed, that is to say, the second day from the evolution of the flocci on the outside of the body of the silk-worm. But whatever be the mode of formation of the sporidia in this family, their morphosis or evolution is not the same in both the sections. In the one they issue, or appear to issue, from the extremity of the filament, and are grouped after a peculiar manner predestined for each genus and species. In the *Sporotrichaceæ* they are free and dispersed among the filaments; in *Isariæ* they are acrogenous, or adnate on the summit of a branch; in *Botrytideæ* united usually in spherical heads of greater or less size, around the tip of the principal thread or its branches. This grouping takes place successively, as I have convinced myself in tracing from hour to hour the evolution of *Botrytis*

* It is probable that they are not, properly speaking, sporidiola, at least if we may judge by what takes place in the germination of compound sporidia of the fourth family, where a shoot is given off *opposite* to each globule. See Mont., Ann. Sc. Nat., t. xiv. pl. 19. fig. 6 i; and Berk., Ann. of Nat. Hist., vol. vi. tab. xi. fig. 8 b.—M. J. B.

† The nearest approach is in *Phycomyces nitens* and the Brazilian *Mucor virens* and *cynocephalus*.—M. J. B.

Bassiana: My belief was, that the spores, formed in the tube of the principal filaments or branches, issued from their tips, carrying before them the extremity of the thread like a cul-de-sac, which formed their second coat or episporium, and in the end adhered at the point of their passage*. In some genera, instead of being grouped in this manner in more or less fertile heads, the sporidia (*moniliformiter concatenata*) form necklaces which crown the digitate, fasciculate, or verticillate branches of the plant (e. g. *Penicillium*, *Aspergillus*, &c.). In the genus *Torula*, these same chains or necklaces of sporidia constitute almost all the fungus, and *Oidium* is formed of filaments which are changed almost completely into spores.

In *Mucorina* this morphosis takes place in quite a different way. It is between the kind of columella with which we have seen most of the species are furnished, and the peridiolum which arises from the dilatation of the tip of the filament, that the sporaceous mass, accumulated at first by the ascent of the juices, passes successively through a multitude of changes, extremely well indicated by Corda (Ic. Fung. ii. p. 19), before arriving at the state of spores, and acquiring their perfect maturity†.

We must not forget that the sporidia of *Mucedines* are capable of being developed in liquids, and giving rise to confervoid productions which have often been taken for Algæ‡. They show the analogy, or, as it were, the link between these productions; but they are easily distinguished by the absence of all fructification so long as they remain submerged; it is only when they reach the surface of the liquid that the evolution of the spores can take place. The genus *Leptomitus* and many others offer examples of these barren mycelia; they are, as regards liquids, what the genera *Hyphe*, *Himantia*, *Byssus*, &c., are to places deprived of light. A multitude of species in the work of Biasoletti (Di alc. Alg. Microsc., Trieste, 1832) have no better origin. I believe that the same may be said of the transformation of the globules of milk into *Penicillium glaucum* §.

* This is perhaps one of the most important questions in the physiology of Fungi. If the learned author himself has not leisure to repeat his observations, which unfortunately I know to be the case, it is greatly to be wished that some competent and unprejudiced naturalist would undertake the task. In *Hymenomyces* the spores are gradually produced at the tips of the spicules, and certainly are not developed within the threads; and this is the case with *Botrytis parasitica* and its allies. I am not aware that the memoir itself has ever been published. The only account I have seen of it is in 'Comptes Rendus.'—M. J. B.

† It is necessary to mention that the author is not responsible for the correctness of statements like the present. They are given on the faith of the respective authors, it being impossible to verify every observation.

‡ Schimper imagines that the greater part of freshwater Confervæ originate from an analogous cause, viz. the anormal development of the spores of Mosses; and that each species of moss corresponds to a species of conferva, &c. See Soc. Hist. Nat. Strasb., 3 December 1833.

§ Consult on this subject, Fries, Syst. Orb. Veg., p. 42.—Dutrochet sur l'origine des Moisissures, Ann. Sc. Nat., 2 sér. tom. i. p. 30, &c.—Berkeley on a conferv. state of *Mucor clavatus* in Mag. of Zool. and Bot., tom. ii. p. 351, and Meyen's remarks on this paper in his Jahresberichte.

There is still a remarkable fact which we must not omit. *Thamnidium elegans*, Lk. (*Ascophora elegans*, Corda, Ic. Fung., iii. p. 14. t. 2. f. 43.) has presented to Corda two sorts of fructification*, as is the case with all other agamous plants. The verticillate ramuli are terminated by reproductive gemmæ, while the main thread is tipped by a true sporiferous peridiolum.

The little plants which form this family are worthy of the greatest attention, especially in a physiological point of view. They are not less capable of exciting in the highest degree the curiosity of the naturalist, whose pleasure it is to contemplate the wonders of creation. If they less attract the vulgar eye, it is because without the microscope to it they scarcely exist. What a new world do we owe then to this instrument! The *Mucedines*, for example, which rival in elegance some of our prettiest articulated hydrophytes, form sometimes in the space of a square inch an immense forest of trees from one to two lines high, varied, but always elegant in their ramification, bearing at the extremities of their whorled, umbellate, or paniced branches, bunches or heads of seed producing the most exquisite effect. Sometimes they are less branched, and have their uncinatè, clavate, umbellate or shrubby tips loaded with fruit. Nature, in compensation for their brief existence, reproduces them everywhere, so that it is always easy to find individuals for examination.

The *Hyphomycetes* grow on vegetable or animal substances in the course of decomposition†. In general they are not difficult in their choice, though some species are confined to particular habitats. The most common of all, *Penicillium glaucum*, grows on all sorts of substances, and in all latitudes.

On the one side the *Hyphomycetes* approach the *Coniomycetes*, the lower individuals in the series differing only in the free development of their *hyphasma*; on the other side they touch upon the *Gasteromycetes*, by those *Mucorini* which have a separable peridium, (e. g. *Pilobolus*). Fries compares them to his *Ulvaceæ* (Fl. Scan. p. 357), our subfamily *Zoospermæ*, and remarks that, like these, they have both their inarticulate and septate representatives.

In the two families which I have just examined, the individuals of which have little use in the œconomy of nature, except to hasten the decomposition of animal and vegetable substances, or to furnish nutriment for a multitude of insects, the threads at the extremity of which the sporidia grow may be called *erecto-divergent*; in the following families these same filaments, variously woven and entangled, end always, except in the *Pyrenomycetes*, in becoming *erecto-convergent*.

[To be continued.]

* Something of the kind is exhibited by *Ag. racemosus*. The lateral heads have the structure of *Stilbum*.—M. J. B.

† An account has lately been published in Ann. Sc. Nat. 1841, of a mould developed in the stomach of a living bird. A fact of the same kind has been described before, in Dr. Valentin's Repertorium für Anatomie und Physiologie, bd. 1. 1836.—M. J. B.